SEQUENCE LISTING

<110> GENSET S.A.

<120> NOVEL KCNQ POLYPEPTIDES, MODULATORS THEREOF, AND THEIR USES IN THE TREATMENT OF MENTAL DISORDERS

<130> 794 WO

<150> US 60/391,359
<151> 2002-06-25

<160> 47

<170> PatentIn version 3.1

<210> 1
<211> 1932
<212> DNA
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Met Val Gln Lys Ser Arg Asn Gly Gly Val Tyr Pro Gly Pro Ser Gly
1   5   10   15

gag aag aag ctg aag gtg ggc ttc gtg ggg ctg gac ccc ggc gcg ccc   96
Glu Lys Lys Leu Lys Val Gly Phe Val Gly Leu Asp Pro Gly Ala Pro
                20   25   30

gac tcc acc cgg gac ggg gcg ctg ctg atc gcc ggc tcc gag gcc ccc   144
Asp Ser Thr Arg Asp Gly Ala Leu Leu Ile Ala Gly Ser Glu Ala Pro
            35   40   45

aag cgc ggc agc atc ctc agc aaa cct cgc gcg ggc ggc gcg ggc gcc   192
Lys Arg Gly Ser Ile Leu Ser Lys Pro Arg Ala Gly Gly Ala Gly Ala
        50   55   60

ggg aag ccc ccc aag cgc aac gcc ttc tac cgc aag ctg cag aat ttc   240
Gly Lys Pro Pro Lys Arg Asn Ala Phe Tyr Arg Lys Leu Gln Asn Phe
65   70   75   80

ctc tac aac gtg ctg gag cgg ccg cgc ggc tgg gcg ttc atc tac cac   288
Leu Tyr Asn Val Leu Glu Arg Pro Arg Gly Trp Ala Phe Ile Tyr His
                85   90   95

gcc tac gtg ttc ctc ctg gtt ttc tcc tgc ctc gtg ctg tct gtg ttt   336
Ala Tyr Val Phe Leu Leu Val Phe Ser Cys Leu Val Leu Ser Val Phe
       100   105   110

tcc acc atc aag gag tat gag aag agc tcg gag ggg gcc ctc tac atc   384
Ser Thr Ile Lys Glu Tyr Glu Lys Ser Ser Glu Gly Ala Leu Tyr Ile
       115   120   125

ctg gaa atc gtg act atc gtg gtg ttt ggc gtg gag tac ttc gtg cgg   432
Leu Glu Ile Val Thr Ile Val Val Phe Gly Val Glu Tyr Phe Val Arg
    130   135   140

atc tgg gcc gca ggc tgc tgc tgc cgg tac cgt ggc tgg agg ggg cgg   480
Ile Trp Ala Ala Gly Cys Cys Cys Arg Tyr Arg Gly Trp Arg Gly Arg
145   150   155   160

ctc aag ttt gcc cgg aaa ccg ttc tgt gtg att gac atc atg gtg ctc   528
Leu Lys Phe Ala Arg Lys Pro Phe Cys Val Ile Asp Ile Met Val Leu
       165   170   175

atc gcc tcc att gcg gtg ctg gcc gcc ggc tcc cag ggc aac gtc ttt   576
Ile Ala Ser Ile Ala Val Leu Ala Ala Gly Ser Gln Gly Asn Val Phe
       180   185   190

gcc aca tct gcg ctc cgg agc ctg cgc ttc ctg cag att ctg cgg atg   624
Ala Thr Ser Ala Leu Arg Ser Leu Arg Phe Leu Gln Ile Leu Arg Met
       195   200   205

atc cgc atg gac cgg cgg gga ggc acc tgg aag ctg ctg ggc tct gtg   672
Ile Arg Met Asp Arg Arg Gly Gly Thr Trp Lys Leu Leu Gly Ser Val
    210   215   220

gtc tat gcc cac agc aag gag ctg gtc act gcc tgg tac atc ggc ttc   720
Val Tyr Ala His Ser Lys Glu Leu Val Thr Ala Trp Tyr Ile Gly Phe
225   230   235   240

ctt tgt ctc atc ctg gcc tcg ttc ctg gtg tac ttg gca gag aag ggg   768
Leu Cys Leu Ile Leu Ala Ser Phe Leu Val Tyr Leu Ala Glu Lys Gly
       245   250   255

gag aac gac cac ttt gac acc tac gcg gat gca ctc tgg tgg ggc ctg   816
Glu Asn Asp His Phe Asp Thr Tyr Ala Asp Ala Leu Trp Trp Gly Leu
       260   265   270

atc acg ctg acc acc att ggc tac ggg gac aag tac ccc cag acc tgg   864
Ile Thr Leu Thr Thr Ile Gly Tyr Gly Asp Lys Tyr Pro Gln Thr Trp
       275   280   285

aac ggc agg ctc ctt gcg gca acc ttc acc ctc atc ggt gtc tcc ttc   912

Asn Gly Arg Leu Leu Ala Ala Thr Phe Thr Leu Ile Gly Val Ser Phe
 290   295   300

ttc gcg ctg cct gca ggc atc ttg ggg tct ggg ttt gcc ctg aag gtt   960
Phe Ala Leu Pro Ala Gly Ile Leu Gly Ser Gly Phe Ala Leu Lys Val
305   310   315   320

cag gag cag cac agg cag aag cac ttt gag aag agg cgg aac ccg gca   1008
Gln Glu Gln His Arg Gln Lys His Phe Glu Lys Arg Arg Asn Pro Ala
      325   330   335

gca ggc ctg atc cag tcg gcc tgg aga ttc tac gcc acc aac ctc tcg   1056
Ala Gly Leu Ile Gln Ser Ala Trp Arg Phe Tyr Ala Thr Asn Leu Ser
       340   345   350

cgc aca gac ctg cac tcc acg tgg cag tac tac gag cga acg gtc acc   1104
Arg Thr Asp Leu His Ser Thr Trp Gln Tyr Tyr Glu Arg Thr Val Thr
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gtg ccc atg tac agt tcg caa act caa acc tac ggg gcc tcc aga ctt   1152
Val Pro Met Tyr Ser Ser Gln Thr Gln Thr Tyr Gly Ala Ser Arg Leu
   370   375   380

atc ccc ccg ctg aac cag ctg gag ctg ctg agg aac ctc aag agt aaa   1200
Ile Pro Pro Leu Asn Gln Leu Glu Leu Leu Arg Asn Leu Lys Ser Lys
385   390   395   400

tct gga ctc gct ttc agg aag gac ccc ccg ccg gag ccg tct cca agt   1248
Ser Gly Leu Ala Phe Arg Lys Asp Pro Pro Pro Glu Pro Ser Pro Ser
       405   410   415

aaa ggc agc ccg tgc aga ggg ccc ctg tgt gga tgc tgc ccc gga cgc   1296
Lys Gly Ser Pro Cys Arg Gly Pro Leu Cys Gly Cys Cys Pro Gly Arg
     420   425   430

tct agc cag aag gtc agt ttg aaa gat cgt gtc ttc tcc agc ccc cga   1344
Ser Ser Gln Lys Val Ser Leu Lys Asp Arg Val Phe Ser Ser Pro Arg
    435   440   445

ggc gtg gct gcc aag ggg aag ggg tcc ccg cag gcc cag act gtg agg   1392
Gly Val Ala Ala Lys Gly Lys Gly Ser Pro Gln Ala Gln Thr Val Arg
  450   455   460

cgg tca ccc agc gcc gac cag agc ctc gag gac agc ccc agc aag gtg   1440
Arg Ser Pro Ser Ala Asp Gln Ser Leu Glu Asp Ser Pro Ser Lys Val
465   470   475   480

ccc aag agc tgg agc ttc ggg gac cgc agc cgg gca cgc cag gct ttc   1488
Pro Lys Ser Trp Ser Phe Gly Asp Arg Ser Arg Ala Arg Gln Ala Phe
     485   490   495

cgc atc aag ggt gcc gcg tca cgg cag aac tca gaa gaa gca agc ctc   1536
Arg Ile Lys Gly Ala Ala Ser Arg Gln Asn Ser Glu Glu Ala Ser Leu
          500   505   510

ccc gga gag gac att gtg gat gac aag agc tgc ccc tgc gag ttt gtg   1584
Pro Gly Glu Asp Ile Val Asp Asp Lys Ser Cys Pro Cys Glu Phe Val
          515   520   525

acc gag gac ctg acc ccg ggc ctc aaa gtc agc atc aga gcc gtg tgt   1632
Thr Glu Asp Leu Thr Pro Gly Leu Lys Val Ser Ile Arg Ala Val Cys
          530   535   540

gtc atg cgg ttc ctg gtg tcc aag cgg aag ttc aag gag agc ctg cgg   1680
Val Met Arg Phe Leu Val Ser Lys Arg Lys Phe Lys Glu Ser Leu Arg
545   550   555   560

ccc tac gac gtg atg gac gtc atc gag cag tac tca gcc ggc cac ctg   1728
Pro Tyr Asp Val Met Asp Val Ile Glu Gln Tyr Ser Ala Gly His Leu
          565   570   575

gac atg ctg tcc cga att aag agc ctg cag tcc agg caa gag ccc cgc   1776
Asp Met Leu Ser Arg Ile Lys Ser Leu Gln Ser Arg Gln Glu Pro Arg
          580   585   590

ctg cct gtc cag cag ggg aca aga acg ggg tgg gct tct ggg aca aag   1824
Leu Pro Val Gln Gln Gly Thr Arg Thr Gly Trp Ala Ser Gly Thr Lys
          595   600   605

ccc act gtg gcc cat ggt ggg agt gca ggg ggt gtg tgg gcg ggg cct   1872
Pro Thr Val Ala His Gly Gly Ser Ala Gly Gly Val Trp Ala Gly Pro
          610   615   620

cct ccc cac cca cgt cgg cct ctg tca gct tct gtt gtg tct tca caa   1920
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Ser Leu Phe

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       35   40   45

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     50   55   60

Gly Lys Pro Pro Lys Arg Asn Ala Phe Tyr Arg Lys Leu Gln Asn Phe
65   70   75   80

Leu Tyr Asn Val Leu Glu Arg Pro Arg Gly Trp Ala Phe Ile Tyr His
       85   90   95

Ala Tyr Val Phe Leu Leu Val Phe Ser Cys Leu Val Leu Ser Val Phe
       100   105   110

Ser Thr Ile Lys Glu Tyr Glu Lys Ser Ser Glu Gly Ala Leu Tyr Ile
       115   120   125

Leu Glu Ile Val Thr Ile Val Val Phe Gly Val Glu Tyr Phe Val Arg
       130   135   140

Ile Trp Ala Ala Gly Cys Cys Cys Arg Tyr Arg Gly Trp Arg Gly Arg
145   150   155   160

Leu Lys Phe Ala Arg Lys Pro Phe Cys Val Ile Asp Ile Met Val Leu
       165   170   175

Ile Ala Ser Ile Ala Val Leu Ala Ala Gly Ser Gln Gly Asn Val Phe
       180   185   190

Ala Thr Ser Ala Leu Arg Ser Leu Arg Phe Leu Gln Ile Leu Arg Met
       195   200   205

Ile Arg Met Asp Arg Arg Gly Gly Thr Trp Lys Leu Leu Gly Ser Val
    210   215   220

Val Tyr Ala His Ser Lys Glu Leu Val Thr Ala Trp Tyr Ile Gly Phe
225   230   235   240

Leu Cys Leu Ile Leu Ala Ser Phe Leu Val Tyr Leu Ala Glu Lys Gly
          245   250   255

Glu Asn Asp His Phe Asp Thr Tyr Ala Asp Ala Leu Trp Trp Gly Leu
    260   265   270

Ile Thr Leu Thr Thr Ile Gly Tyr Gly Asp Lys Tyr Pro Gln Thr Trp
    275   280   285

Asn Gly Arg Leu Leu Ala Ala Thr Phe Thr Leu Ile Gly Val Ser Phe
    290   295   300

Phe Ala Leu Pro Ala Gly Ile Leu Gly Ser Gly Phe Ala Leu Lys Val
305   310   315   320

Gln Glu Gln His Arg Gln Lys His Phe Glu Lys Arg Arg Asn Pro Ala
          325   330   335

Ala Gly Leu Ile Gln Ser Ala Trp Arg Phe Tyr Ala Thr Asn Leu Ser
    340   345   350

Arg Thr Asp Leu His Ser Thr Trp Gln Tyr Tyr Glu Arg Thr Val Thr
    355   360   365

Val Pro Met Tyr Ser Ser Gln Thr Gln Thr Tyr Gly Ala Ser Arg Leu
    370   375   380

Ile Pro Pro Leu Asn Gln Leu Glu Leu Leu Arg Asn Leu Lys Ser Lys
385   390   395   400

Ser Gly Leu Ala Phe Arg Lys Asp Pro Pro Pro Glu Pro Ser Pro Ser

                405   410   415

Lys Gly Ser Pro Cys Arg Gly Pro Leu Cys Gly Cys Cys Pro Gly Arg
        420   425   430

Ser Ser Gln Lys Val Ser Leu Lys Asp Arg Val Phe Ser Ser Pro Arg
        435   440   445

Gly Val Ala Ala Lys Gly Lys Gly Ser Pro Gln Ala Gln Thr Val Arg
      450   455   460

Arg Ser Pro Ser Ala Asp Gln Ser Leu Glu Asp Ser Pro Ser Lys Val
465   470   475   480

Pro Lys Ser Trp Ser Phe Gly Asp Arg Ser Arg Ala Arg Gln Ala Phe
          485   490   495

Arg Ile Lys Gly Ala Ala Ser Arg Gln Asn Ser Glu Glu Ala Ser Leu
        500   505   510

Pro Gly Glu Asp Ile Val Asp Asp Lys Ser Cys Pro Cys Glu Phe Val
        515   520   525

Thr Glu Asp Leu Thr Pro Gly Leu Lys Val Ser Ile Arg Ala Val Cys
      530   535   540

Val Met Arg Phe Leu Val Ser Lys Arg Lys Phe Lys Glu Ser Leu Arg
545   550   555   560

Pro Tyr Asp Val Met Asp Val Ile Glu Gln Tyr Ser Ala Gly His Leu
          565   570   575

Asp Met Leu Ser Arg Ile Lys Ser Leu Gln Ser Arg Gln Glu Pro Arg
        580   585   590

Leu Pro Val Gln Gln Gly Thr Arg Thr Gly Trp Ala Ser Gly Thr Lys
        595   600   605

Pro Thr Val Ala His Gly Gly Ser Ala Gly Gly Val Trp Ala Gly Pro
   610   615   620

Pro Pro His Pro Arg Arg Pro Leu Ser Ala Ser Val Val Ser Ser Gln
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Ser Leu Phe

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1   5   10   15

gag aag aag ctg aag gtg ggc ttc gtg ggg ctg gac ccc ggc gcg ccc   96
Glu Lys Lys Leu Lys Val Gly Phe Val Gly Leu Asp Pro Gly Ala Pro
      20   25   30

gac tcc acc cgg gac ggg gcg ctg ctg atc gcc ggc tcc gag gcc ccc   144
Asp Ser Thr Arg Asp Gly Ala Leu Leu Ile Ala Gly Ser Glu Ala Pro
    35   40   45

aag cgc ggc agc atc ctc agc aaa cct cgc gcg ggc ggc gcg ggc gcc   192
Lys Arg Gly Ser Ile Leu Ser Lys Pro Arg Ala Gly Gly Ala Gly Ala
   50   55   60

ggg aag ccc ccc aag cgc aac gcc ttc tac cgc aag ctg cag aat ttc   240
Gly Lys Pro Pro Lys Arg Asn Ala Phe Tyr Arg Lys Leu Gln Asn Phe
65   70   75   80

ctc tac aac gtg ctg gag cgg ccg cgc ggc tgg gcg ttc atc tac cac   288
Leu Tyr Asn Val Leu Glu Arg Pro Arg Gly Trp Ala Phe Ile Tyr His
      85   90   95

gcc tac gtg ttc ctc ctg gtt ttc tcc tgc ctc gtg ctg tct gtg ttt   336
Ala Tyr Val Phe Leu Leu Val Phe Ser Cys Leu Val Leu Ser Val Phe

　　　　100　　　　　　105　　　　　　　110

tcc acc atc aag gag tat gag aag agc tcg gag ggg gcc ctc tac atc　　　384
Ser Thr Ile Lys Glu Tyr Glu Lys Ser Ser Glu Gly Ala Leu Tyr Ile
　　　　115　　　　　　120　　　　　　　125

ctg gaa atc gtg act atc gtg gtg ttt ggc gtg gag tac ttc gtg cgg　　　432
Leu Glu Ile Val Thr Ile Val Val Phe Gly Val Glu Tyr Phe Val Arg
　　130　　　　　　135　　　　　　140

atc tgg gcc gca ggc tgc tgc tgc cgg tac cgt ggc tgg agg ggg cgg　　　480
Ile Trp Ala Ala Gly Cys Cys Cys Arg Tyr Arg Gly Trp Arg Gly Arg
145　　　　　　150　　　　　　155　　　　　　160

ctc aag ttt gcc cgg aaa ccg ttc tgt gtg att gac atc atg gtg ctc　　　528
Leu Lys Phe Ala Arg Lys Pro Phe Cys Val Ile Asp Ile Met Val Leu
　　　　165　　　　　　170　　　　　　175

atc gcc tcc att gcg gtg ctg gcc gcc ggc tcc cag ggc aac gtc ttt　　　576
Ile Ala Ser Ile Ala Val Leu Ala Ala Gly Ser Gln Gly Asn Val Phe
　　　　180　　　　　　185　　　　　　190

gcc aca tct gcg ctc cgg agc ctg cgc ttc ctg cag att ctg cgg atg　　　624
Ala Thr Ser Ala Leu Arg Ser Leu Arg Phe Leu Gln Ile Leu Arg Met
　　　195　　　　　　200　　　　　　205

atc cgc atg gac cgg cgg gga ggc acc tgg aag ctg ctg ggc tct gtg　　　672
Ile Arg Met Asp Arg Arg Gly Gly Thr Trp Lys Leu Leu Gly Ser Val
　　210　　　　　　215　　　　　　220

gtc tat gcc cac agc aag gag ctg gtc act gcc tgg tac atc ggc ttc　　　720
Val Tyr Ala His Ser Lys Glu Leu Val Thr Ala Trp Tyr Ile Gly Phe
225　　　　　　230　　　　　　235　　　　　　240

ctt tgt ctc atc ctg gcc tcg ttc ctg gtg tac ttg gca gag aag ggg　　　768
Leu Cys Leu Ile Leu Ala Ser Phe Leu Val Tyr Leu Ala Glu Lys Gly
　　　　245　　　　　　250　　　　　　255

gag aac gac cac ttt gac acc tac gcg gat gca ctc tgg tgg ggc ctg　　　816
Glu Asn Asp His Phe Asp Thr Tyr Ala Asp Ala Leu Trp Trp Gly Leu
　　　260　　　　　　265　　　　　　270

atc acg ctg acc acc att ggc tac ggg gac aag tac ccc cag acc tgg　　　864
Ile Thr Leu Thr Thr Ile Gly Tyr Gly Asp Lys Tyr Pro Gln Thr Trp
　　　　275　　　　　　280　　　　　　285

aac ggc agg ctc ctt gcg gca acc ttc acc ctc atc ggt gtc tcc ttc　　　912
Asn Gly Arg Leu Leu Ala Ala Thr Phe Thr Leu Ile Gly Val Ser Phe
　　290　　　　　　295　　　　　　300

ttc gcg ctg cct gca ggc atc ttg ggg tct ggg ttt gcc ctg aag gtt   960
Phe Ala Leu Pro Ala Gly Ile Leu Gly Ser Gly Phe Ala Leu Lys Val
305   310   315   320

cag gag cag cac agg cag aag cac ttt gag aag agg cgg aac ccg gca   1008
Gln Glu Gln His Arg Gln Lys His Phe Glu Lys Arg Arg Asn Pro Ala
              325   330   335

gca ggc ctg atc cag tcg gcc tgg aga ttc tac gcc acc aac ctc tcg   1056
Ala Gly Leu Ile Gln Ser Ala Trp Arg Phe Tyr Ala Thr Asn Leu Ser
              340   345   350

cgc aca gac ctg cac tcc acg tgg cag tac tac gag cga acg gtc acc   1104
Arg Thr Asp Leu His Ser Thr Trp Gln Tyr Tyr Glu Arg Thr Val Thr
              355   360   365

gtg ccc atg tac agt tcg caa act caa acc tac ggg gcc tcc aga ctt   1152
Val Pro Met Tyr Ser Ser Gln Thr Gln Thr Tyr Gly Ala Ser Arg Leu
       370   375   380

atc ccc ccg ctg aac cag ctg gag ctg ctg agg aac ctc aag agt aaa   1200
Ile Pro Pro Leu Asn Gln Leu Glu Leu Leu Arg Asn Leu Lys Ser Lys
385   390   395   400

tct gga ctc gct ttc agg aag gac ccc ccg ccg gag ccg tct cca agc   1248
Ser Gly Leu Ala Phe Arg Lys Asp Pro Pro Pro Glu Pro Ser Pro Ser
              405   410   415

cag aag gtc agt ttg aaa gat cgt gtc ttc tcc agc ccc cga ggc gtg   1296
Gln Lys Val Ser Leu Lys Asp Arg Val Phe Ser Ser Pro Arg Gly Val
              420   425   430

gct gcc aag ggg aag ggg tcc ccg cag gcc cag act gtg agg cgg tca   1344
Ala Ala Lys Gly Lys Gly Ser Pro Gln Ala Gln Thr Val Arg Arg Ser
              435   440   445

ccc agc gcc gac cag agc ctc gag gac agc ccc agc aag gtg ccc aag   1392
Pro Ser Ala Asp Gln Ser Leu Glu Asp Ser Pro Ser Lys Val Pro Lys
       450   455   460

agc tgg agc ttc ggg gac cgc agc cgg gca cgc cag gct ttc cgc atc   1440
Ser Trp Ser Phe Gly Asp Arg Ser Arg Ala Arg Gln Ala Phe Arg Ile
465   470   475   480

aag ggt gcc gcg tca cgg cag aac tca gaa gaa gca agc ctc ccc gga   1488
Lys Gly Ala Ala Ser Arg Gln Asn Ser Glu Glu Ala Ser Leu Pro Gly
              485   490   495

gag gac att gtg gat gac aag agc tgc ccc tgc gag ttt gtg acc gag   1536
Glu Asp Ile Val Asp Asp Lys Ser Cys Pro Cys Glu Phe Val Thr Glu

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gac ctg acc ccg ggc ctc aaa gtc agc atc aga gcc gtg tgt gtc atg     1584
Asp Leu Thr Pro Gly Leu Lys Val Ser Ile Arg Ala Val Cys Val Met
     515            520            525
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cgg ttc ctg gtg tcc aag cgg aag ttc aag gag agc ctg cgg ccc tac     1632
Arg Phe Leu Val Ser Lys Arg Lys Phe Lys Glu Ser Leu Arg Pro Tyr
     530            535            540
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gac gtg atg gac gtc atc gag cag tac tca gcc ggc cac ctg gac atg     1680
Asp Val Met Asp Val Ile Glu Gln Tyr Ser Ala Gly His Leu Asp Met
545            550            555            560
```

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ctg tcc cga att aag agc ctg cag tcc agg caa gag ccc cgc ctg cct     1728
Leu Ser Arg Ile Lys Ser Leu Gln Ser Arg Gln Glu Pro Arg Leu Pro
          565            570            575
```

```
gtc cag cag ggg aca aga acg ggg tgg gct tct ggg aca aag ccc act     1776
Val Gln Gln Gly Thr Arg Thr Gly Trp Ala Ser Gly Thr Lys Pro Thr
          580            585            590
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gtg gcc cat ggt ggg agt gca ggg ggt gtg tgg gcg ggg cct cct ccc     1824
Val Ala His Gly Gly Ser Ala Gly Gly Val Trp Ala Gly Pro Pro Pro
          595            600            605
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cac cca cgt cgg cct ctg tca gct tct gtt gtg tct tca caa agt ctg     1872
His Pro Arg Arg Pro Leu Ser Ala Ser Val Val Ser Ser Gln Ser Leu
     610            615            620
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ttt taa                                        1878
Phe
625
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Met Val Gln Lys Ser Arg Asn Gly Gly Val Tyr Pro Gly Pro Ser Gly
1            5            10            15
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Glu Lys Lys Leu Lys Val Gly Phe Val Gly Leu Asp Pro Gly Ala Pro
     20            25            30
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Asp Ser Thr Arg Asp Gly Ala Leu Leu Ile Ala Gly Ser Glu Ala Pro
35   40   45

Lys Arg Gly Ser Ile Leu Ser Lys Pro Arg Ala Gly Gly Ala Gly Ala
50   55   60

Gly Lys Pro Pro Lys Arg Asn Ala Phe Tyr Arg Lys Leu Gln Asn Phe
65   70   75   80

Leu Tyr Asn Val Leu Glu Arg Pro Arg Gly Trp Ala Phe Ile Tyr His
85   90   95

Ala Tyr Val Phe Leu Leu Val Phe Ser Cys Leu Val Leu Ser Val Phe
100   105   110

Ser Thr Ile Lys Glu Tyr Glu Lys Ser Ser Glu Gly Ala Leu Tyr Ile
115   120   125

Leu Glu Ile Val Thr Ile Val Val Phe Gly Val Glu Tyr Phe Val Arg
130   135   140

Ile Trp Ala Ala Gly Cys Cys Cys Arg Tyr Arg Gly Trp Arg Gly Arg
145   150   155   160

Leu Lys Phe Ala Arg Lys Pro Phe Cys Val Ile Asp Ile Met Val Leu
165   170   175

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180   185   190

Ala Thr Ser Ala Leu Arg Ser Leu Arg Phe Leu Gln Ile Leu Arg Met
195   200   205

Ile Arg Met Asp Arg Arg Gly Gly Thr Trp Lys Leu Leu Gly Ser Val
210   215   220

Val Tyr Ala His Ser Lys Glu Leu Val Thr Ala Trp Tyr Ile Gly Phe
225   230   235   240

Leu Cys Leu Ile Leu Ala Ser Phe Leu Val Tyr Leu Ala Glu Lys Gly
        245   250   255

Glu Asn Asp His Phe Asp Thr Tyr Ala Asp Ala Leu Trp Trp Gly Leu
        260   265   270

Ile Thr Leu Thr Thr Ile Gly Tyr Gly Asp Lys Tyr Pro Gln Thr Trp
        275   280   285

Asn Gly Arg Leu Leu Ala Ala Thr Phe Thr Leu Ile Gly Val Ser Phe
    290   295   300

Phe Ala Leu Pro Ala Gly Ile Leu Gly Ser Gly Phe Ala Leu Lys Val
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Gln Glu Gln His Arg Gln Lys His Phe Glu Lys Arg Arg Asn Pro Ala
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Ala Gly Leu Ile Gln Ser Ala Trp Arg Phe Tyr Ala Thr Asn Leu Ser
        340   345   350

Arg Thr Asp Leu His Ser Thr Trp Gln Tyr Tyr Glu Arg Thr Val Thr
        355   360   365

Val Pro Met Tyr Ser Ser Gln Thr Gln Thr Tyr Gly Ala Ser Arg Leu
        370   375   380

Ile Pro Pro Leu Asn Gln Leu Glu Leu Leu Arg Asn Leu Lys Ser Lys
385   390   395   400

Ser Gly Leu Ala Phe Arg Lys Asp Pro Pro Pro Glu Pro Ser Pro Ser
        405   410   415

Gln Lys Val Ser Leu Lys Asp Arg Val Phe Ser Ser Pro Arg Gly Val
        420   425   430

Ala Ala Lys Gly Lys Gly Ser Pro Gln Ala Gln Thr Val Arg Arg Ser
   435   440   445

Pro Ser Ala Asp Gln Ser Leu Glu Asp Ser Pro Ser Lys Val Pro Lys
   450   455   460

Ser Trp Ser Phe Gly Asp Arg Ser Arg Ala Arg Gln Ala Phe Arg Ile
465   470   475   480

Lys Gly Ala Ala Ser Arg Gln Asn Ser Glu Glu Ala Ser Leu Pro Gly
        485   490   495

Glu Asp Ile Val Asp Asp Lys Ser Cys Pro Cys Glu Phe Val Thr Glu
        500   505   510

Asp Leu Thr Pro Gly Leu Lys Val Ser Ile Arg Ala Val Cys Val Met
   515   520   525

Arg Phe Leu Val Ser Lys Arg Lys Phe Lys Glu Ser Leu Arg Pro Tyr
   530   535   540

Asp Val Met Asp Val Ile Glu Gln Tyr Ser Ala Gly His Leu Asp Met
545   550   555   560

Leu Ser Arg Ile Lys Ser Leu Gln Ser Arg Gln Glu Pro Arg Leu Pro
        565   570   575

Val Gln Gln Gly Thr Arg Thr Gly Trp Ala Ser Gly Thr Lys Pro Thr
     580   585   590

Val Ala His Gly Gly Ser Ala Gly Gly Val Trp Ala Gly Pro Pro Pro
   595   600   605

His Pro Arg Arg Pro Leu Ser Ala Ser Val Val Ser Ser Gln Ser Leu
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Phe
625

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1               5               10              15


gag aag aag ctg aag gtg ggc ttc gtg ggg ctg gac ccc ggc gcg ccc      96
Glu Lys Lys Leu Lys Val Gly Phe Val Gly Leu Asp Pro Gly Ala Pro
            20              25              30


gac tcc acc cgg gac ggg gcg ctg ctg atc gcc ggc tcc gag gcc ccc      144
Asp Ser Thr Arg Asp Gly Ala Leu Leu Ile Ala Gly Ser Glu Ala Pro
        35              40              45


aag cgc ggc agc atc ctc agc aaa cct cgc gcg ggc ggc gcg ggc gcc      192
Lys Arg Gly Ser Ile Leu Ser Lys Pro Arg Ala Gly Gly Ala Gly Ala
    50              55              60


ggg aag ccc ccc aag cgc aac gcc ttc tac cgc aag ctg cag aat ttc      240
Gly Lys Pro Pro Lys Arg Asn Ala Phe Tyr Arg Lys Leu Gln Asn Phe
65              70              75              80


ctc tac aac gtg ctg gag cgg ccg cgc ggc tgg gcg ttc atc tac cac      288
Leu Tyr Asn Val Leu Glu Arg Pro Arg Gly Trp Ala Phe Ile Tyr His
            85              90              95


gcc tac gtg ttc ctc ctg gtt ttc tcc tgc ctc gtg ctg tct gtg ttt      336
Ala Tyr Val Phe Leu Leu Val Phe Ser Cys Leu Val Leu Ser Val Phe
            100             105             110


tcc acc atc aag gag tat gag aag agc tcg gag ggg gcc ctc tac atc      384
Ser Thr Ile Lys Glu Tyr Glu Lys Ser Ser Glu Gly Ala Leu Tyr Ile
        115             120             125


ctg gaa atc gtg act atc gtg gtg ttt ggc gtg gag tac ttc gtg cgg      432
Leu Glu Ile Val Thr Ile Val Val Phe Gly Val Glu Tyr Phe Val Arg
        130             135             140


atc tgg gcc gca ggc tgc tgc tgc cgg tac cgt ggc tgg agg ggg cgg      480
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Ile Trp Ala Ala Gly Cys Cys Cys Arg Tyr Arg Gly Trp Arg Gly Arg
145   150   155   160

ctc aag ttt gcc cgg aaa ccg ttc tgt gtg att gac atc atg gtg ctc   528
Leu Lys Phe Ala Arg Lys Pro Phe Cys Val Ile Asp Ile Met Val Leu
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atc gcc tcc att gcg gtg ctg gcc gcc ggc tcc cag ggc aac gtc ttt   576
Ile Ala Ser Ile Ala Val Leu Ala Ala Gly Ser Gln Gly Asn Val Phe
            180   185   190

gcc aca tct gcg ctc cgg agc ctg cgc ttc ctg cag att ctg cgg atg   624
Ala Thr Ser Ala Leu Arg Ser Leu Arg Phe Leu Gln Ile Leu Arg Met
            195   200   205

atc cgc atg gac cgg cgg gga ggc acc tgg aag ctg ctg ggc tct gtg   672
Ile Arg Met Asp Arg Arg Gly Gly Thr Trp Lys Leu Leu Gly Ser Val
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gtc tat gcc cac agc aag gag ctg gtc act gcc tgg tac atc ggc ttc   720
Val Tyr Ala His Ser Lys Glu Leu Val Thr Ala Trp Tyr Ile Gly Phe
225   230   235   240

ctt tgt ctc atc ctg gcc tcg ttc ctg gtg tac ttg gca gag aag ggg   768
Leu Cys Leu Ile Leu Ala Ser Phe Leu Val Tyr Leu Ala Glu Lys Gly
            245   250   255

gag aac gac cac ttt gac acc tac gcg gat gca ctc tgg tgg ggc ctg   816
Glu Asn Asp His Phe Asp Thr Tyr Ala Asp Ala Leu Trp Trp Gly Leu
            260   265   270

atc acg ctg acc acc att ggc tac ggg gac aag tac ccc cag acc tgg   864
Ile Thr Leu Thr Thr Ile Gly Tyr Gly Asp Lys Tyr Pro Gln Thr Trp
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aac ggc agg ctc ctt gcg gca acc ttc acc ctc atc ggt gtc tcc ttc   912
Asn Gly Arg Leu Leu Ala Ala Thr Phe Thr Leu Ile Gly Val Ser Phe
            290   295   300

ttc gcg ctg cct gca ggc atc ttg ggg tct ggg ttt gcc ctg aag gtt   960
Phe Ala Leu Pro Ala Gly Ile Leu Gly Ser Gly Phe Ala Leu Lys Val
305   310   315   320

cag gag cag cac agg cag aag cac ttt gag aag agg cgg aac ccg gca   1008
Gln Glu Gln His Arg Gln Lys His Phe Glu Lys Arg Arg Asn Pro Ala
            325   330   335

gca ggc ctg atc cag tcg gcc tgg aga ttc tac gcc acc aac ctc tcg   1056
Ala Gly Leu Ile Gln Ser Ala Trp Arg Phe Tyr Ala Thr Asn Leu Ser
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Arg Thr Asp Leu His Ser Thr Trp Gln Tyr Tyr Glu Arg Thr Val Thr
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Val Pro Met Tyr Arg Leu Ile Pro Pro Leu Asn Gln Leu Glu Leu Leu
     370          375          380


agg aac ctc aag agt aaa tct gga ctc gct ttc agg aag gac ccc ccg    1200
Arg Asn Leu Lys Ser Lys Ser Gly Leu Ala Phe Arg Lys Asp Pro Pro
385          390          395          400


ccg gag ccg tct cca agc cag aag gtc agt ttg aaa gat cgt gtc ttc    1248
Pro Glu Pro Ser Pro Ser Gln Lys Val Ser Leu Lys Asp Arg Val Phe
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Ser Ser Pro Arg Gly Val Ala Ala Lys Gly Lys Gly Ser Pro Gln Ala
          420          425          430


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Gln Thr Val Arg Arg Ser Pro Ser Ala Asp Gln Ser Leu Glu Asp Ser
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ccc agc aag gtg ccc aag agc tgg agc ttc ggg gac cgc agc cgg gca    1392
Pro Ser Lys Val Pro Lys Ser Trp Ser Phe Gly Asp Arg Ser Arg Ala
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Arg Gln Ala Phe Arg Ile Lys Gly Ala Ala Ser Arg Gln Asn Ser Glu
465          470          475          480


gaa gca agc ctc ccc gga gag gac att gtg gat gac aag agc tgc ccc    1488
Glu Ala Ser Leu Pro Gly Glu Asp Ile Val Asp Asp Lys Ser Cys Pro
          485          490          495


tgc gag ttt gtg acc gag gac ctg acc ccg ggc ctc aaa gtc agc atc    1536
Cys Glu Phe Val Thr Glu Asp Leu Thr Pro Gly Leu Lys Val Ser Ile
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aga gcc gtg tgt gtc atg cgg ttc ctg gtg tcc aag cgg aag ttc aag    1584
Arg Ala Val Cys Val Met Arg Phe Leu Val Ser Lys Arg Lys Phe Lys
          515          520          525


gag agc ctg cgg ccc tac gac gtg atg gac gtc atc gag cag tac tca    1632
Glu Ser Leu Arg Pro Tyr Asp Val Met Asp Val Ile Glu Gln Tyr Ser
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gcc ggc cac ctg gac atg ctg tcc cga att aag agc ctg cag tcc agg    1680
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tct ggg aca aag ccc act gtg gcc cat ggt ggg agt gca ggg ggt gtg   1776
Ser Gly Thr Lys Pro Thr Val Ala His Gly Gly Ser Ala Gly Gly Val
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Trp Ala Gly Pro Pro Pro His Pro Arg Arg Pro Leu Ser Ala Ser Val
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        20   25   30

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        35   40   45

Lys Arg Gly Ser Ile Leu Ser Lys Pro Arg Ala Gly Gly Ala Gly Ala
        50   55   60

Gly Lys Pro Pro Lys Arg Asn Ala Phe Tyr Arg Lys Leu Gln Asn Phe
65   70   75   80

Leu Tyr Asn Val Leu Glu Arg Pro Arg Gly Trp Ala Phe Ile Tyr His
        85   90   95

Ala Tyr Val Phe Leu Leu Val Phe Ser Cys Leu Val Leu Ser Val Phe
          100   105   110

Ser Thr Ile Lys Glu Tyr Glu Lys Ser Ser Glu Gly Ala Leu Tyr Ile
          115   120   125

Leu Glu Ile Val Thr Ile Val Val Phe Gly Val Glu Tyr Phe Val Arg
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Ile Trp Ala Ala Gly Cys Cys Cys Arg Tyr Arg Gly Trp Arg Gly Arg
145   150   155   160

Leu Lys Phe Ala Arg Lys Pro Phe Cys Val Ile Asp Ile Met Val Leu
          165   170   175

Ile Ala Ser Ile Ala Val Leu Ala Ala Gly Ser Gln Gly Asn Val Phe
          180   185   190

Ala Thr Ser Ala Leu Arg Ser Leu Arg Phe Leu Gln Ile Leu Arg Met
          195   200   205

Ile Arg Met Asp Arg Arg Gly Gly Thr Trp Lys Leu Leu Gly Ser Val
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Val Tyr Ala His Ser Lys Glu Leu Val Thr Ala Trp Tyr Ile Gly Phe
225   230   235   240

Leu Cys Leu Ile Leu Ala Ser Phe Leu Val Tyr Leu Ala Glu Lys Gly
          245   250   255

Glu Asn Asp His Phe Asp Thr Tyr Ala Asp Ala Leu Trp Trp Gly Leu
          260   265   270

Ile Thr Leu Thr Thr Ile Gly Tyr Gly Asp Lys Tyr Pro Gln Thr Trp
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Asn Gly Arg Leu Leu Ala Ala Thr Phe Thr Leu Ile Gly Val Ser Phe

290   295   300

Phe Ala Leu Pro Ala Gly Ile Leu Gly Ser Gly Phe Ala Leu Lys Val
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Gln Glu Gln His Arg Gln Lys His Phe Glu Lys Arg Arg Asn Pro Ala
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Ala Gly Leu Ile Gln Ser Ala Trp Arg Phe Tyr Ala Thr Asn Leu Ser
              340   345   350

Arg Thr Asp Leu His Ser Thr Trp Gln Tyr Tyr Glu Arg Thr Val Thr
              355   360   365

Val Pro Met Tyr Arg Leu Ile Pro Pro Leu Asn Gln Leu Glu Leu Leu
              370   375   380

Arg Asn Leu Lys Ser Lys Ser Gly Leu Ala Phe Arg Lys Asp Pro Pro
385   390   395   400

Pro Glu Pro Ser Pro Ser Gln Lys Val Ser Leu Lys Asp Arg Val Phe
              405   410   415

Ser Ser Pro Arg Gly Val Ala Ala Lys Gly Lys Gly Ser Pro Gln Ala
              420   425   430

Gln Thr Val Arg Arg Ser Pro Ser Ala Asp Gln Ser Leu Glu Asp Ser
              435   440   445

Pro Ser Lys Val Pro Lys Ser Trp Ser Phe Gly Asp Arg Ser Arg Ala
              450   455   460

Arg Gln Ala Phe Arg Ile Lys Gly Ala Ala Ser Arg Gln Asn Ser Glu
465   470   475   480

Glu Ala Ser Leu Pro Gly Glu Asp Ile Val Asp Asp Lys Ser Cys Pro
              485   490   495

Cys Glu Phe Val Thr Glu Asp Leu Thr Pro Gly Leu Lys Val Ser Ile
        500   505   510

Arg Ala Val Cys Val Met Arg Phe Leu Val Ser Lys Arg Lys Phe Lys
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Glu Ser Leu Arg Pro Tyr Asp Val Met Asp Val Ile Glu Gln Tyr Ser
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Gln Glu Pro Arg Leu Pro Val Gln Gln Gly Thr Arg Thr Gly Trp Ala
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Ser Gly Thr Lys Pro Thr Val Ala His Gly Gly Ser Ala Gly Gly Val
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Lys Arg Gly Ser Ile Leu Ser Lys Pro Arg Ala Gly Gly Ala Gly Ala
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Gly Lys Pro Pro Lys Arg Asn Ala Phe Tyr Arg Lys Leu Gln Asn Phe
65   70   75   80

Leu Tyr Asn Val Leu Glu Arg Pro Arg Gly Trp Ala Phe Ile Tyr His
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Ala Tyr Val Phe Leu Leu Val Phe Ser Cys Leu Val Leu Ser Val Phe
          100   105   110

Ser Thr Ile Lys Glu Tyr Glu Lys Ser Ser Glu Gly Ala Leu Tyr Ile
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Leu Glu Ile Val Thr Ile Val Val Phe Gly Val Glu Tyr Phe Val Arg
   130   135   140

Ile Trp Ala Ala Gly Cys Cys Cys Arg Tyr Arg Gly Trp Arg Gly Arg
145   150   155   160

Leu Lys Phe Ala Arg Lys Pro Phe Cys Val Ile Asp Ile Met Val Leu
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Ile Ala Ser Ile Ala Val Leu Ala Ala Gly Ser Gln Gly Asn Val Phe
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Ala Thr Ser Ala Leu Arg Ser Leu Arg Phe Leu Gln Ile Leu Arg Met
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Ile Arg Met Asp Arg Arg Gly Gly Thr Trp Lys Leu Leu Gly Ser Val
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Val Tyr Ala His Ser Lys Glu Leu Val Thr Ala Trp Tyr Ile Gly Phe
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Leu Cys Leu Ile Leu Ala Ser Phe Leu Val Tyr Leu Ala Glu Lys Gly
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Glu Asn Asp His Phe Asp Thr Tyr Ala Asp Ala Leu Trp Trp Gly Leu
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Ile Thr Leu Thr Thr Ile Gly Tyr Gly Asp Lys Tyr Pro Gln Thr Trp
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Asn Gly Arg Leu Leu Ala Ala Thr Phe Thr Leu Ile Gly Val Ser Phe
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Phe Ala Leu Pro Ala Gly Ile Leu Gly Ser Gly Phe Ala Leu Lys Val
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Gln Glu Gln His Arg Gln Lys His Phe Glu Lys Arg Arg Asn Pro Ala
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Ile Pro Pro Leu Asn Gln Leu Glu Leu Leu Arg Asn Leu Lys Ser Lys
385   390   395   400

Ser Gly Leu Ala Phe Arg Lys Asp Pro Pro Pro Glu Pro Ser Pro Ser
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Lys Gly Ser Pro Cys Arg Gly Pro Leu Cys Gly Cys Cys Pro Gly Arg
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Ser Ser Gln Lys Val Ser Leu Lys Asp Arg Val Phe Ser Ser Pro Arg
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Gly Val Ala Ala Lys Gly Lys Gly Ser Pro Gln Ala Gln Thr Val Arg
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Asp Met Leu Ser Arg Ile Lys Ser Leu Gln Ser Arg Val Asp Gln Ile
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Val Gly Arg Gly Pro Ala Ile Thr Asp Lys Asp Arg Thr Lys Gly Pro
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Val Asn Ile Tyr Met Gln Arg Met Gly Ile Pro Pro Thr Glu Thr Glu
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Ala Tyr Phe Gly Ala Lys Glu Pro Glu Pro Ala Pro Pro Tyr His Ser
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Pro Glu Asp Ser Arg Glu His Val Asp Arg His Gly Cys Ile Val Lys
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Pro Ala Ala Pro Pro Val Gln Cys Pro Pro Ser Thr Ser Trp Gln Pro
705   710   715   720

Gln Ser His Pro Arg Gln Gly His Gly Thr Ser Pro Val Gly Asp His
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Gly Ser Leu Val Arg Ile Pro Pro Pro Pro Ala His Glu Arg Ser Leu
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Tyr Ile Ala Glu Gly Glu Ser Asp Thr Asp Ser Asp Leu Cys Thr Pro
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Val Glu Val Ser Pro Arg Arg Ile Phe Ala Asn Gly His Thr Tyr His
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Ile Asn Ser Ile Ser Val Asn Ser Asp Cys Glu Thr Tyr Met Ser Ala
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Asp Asp Leu Arg Ile Asn Leu Trp His Leu Ala Ile Thr Asp Arg Ser
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Ser Ser Lys Pro Arg Ala Val Leu Lys Pro Arg Arg Val Cys Val Gly
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Gly Lys Arg Arg Arg Asp Asp Ile Ser Val Asp Ser Leu Asp Phe Thr
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Lys Lys Ile Leu His Thr Ala Trp His Pro Ala Glu Asn Ile Ile Ala
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atc gcc gcc acc aac aac ctg tac atc ttc cag gac aag gta aac tct   151595
Ile Ala Ala Thr Asn Asn Leu Tyr Ile Phe Gln Asp Lys Val Asn Ser
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      35   40   45

Val Ile Phe Gln Arg Glu Pro Glu Ser Lys Asn Ala Pro His Ser Gln
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Gly Asp Tyr Asp Val Tyr Ser Thr Phe Gln Ser His Glu Pro Glu Phe
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Asp Tyr Leu Lys Ser Leu Glu Ile Glu Glu Lys Ile Asn Lys Ile Lys
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Trp Leu Pro Gln Gln Asn Ala Ala His Ser Leu Leu Ser Thr Asn Asp
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Lys Thr Ile Lys Leu Trp Lys Ile Thr Glu Arg Asp Lys Arg Pro Glu
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Val Thr Ser Leu Gln Val Pro Val Leu Lys Pro Met Asp Leu Met Val
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Glu Val Ser Pro Arg Arg Ile Phe Ala Asn Gly His Thr Tyr His Ile
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Asp Leu Arg Ile Asn Leu Trp His Leu Ala Ile Thr Asp Arg Ser Phe
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Ile Thr Ala Ser Glu Phe His Pro His His Cys Asn Leu Phe Val Tyr
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Ser Ser Ser Lys Gly Ser Leu Arg Leu Cys Asp Met Pro Ala Ala Ala
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Leu Cys Asp Lys His Ser Lys Leu Phe Glu Glu Pro Glu Asp Pro Ser
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Phe Ser His Ser Asp Arg Tyr Met Leu Thr Arg Asp Tyr Leu Thr Val
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Lys Val Trp Asp Leu Asn Met Glu Ala Arg Pro Ile Glu Thr Tyr Gln
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Val His Asp Tyr Leu Arg Ser Lys Leu Cys Ser Leu Tyr Glu Asn Asp
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Cys Ile Phe Asp Lys Phe Glu Cys Ala Trp Asn Gly Ser Asp Ser Val
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Ile Met Thr Gly Ala Tyr Asn Asn Phe Phe Arg Met Phe Asp Arg Asn
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Thr Lys Arg Asp Val Thr Leu Glu Ala Ser Arg Glu Ser Ser Lys Pro
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Arg Asp Asp Ile Ser Val Asp Ser Leu Asp Phe Thr Lys Lys Ile Leu
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His Thr Ala Trp His Pro Ala Glu Asn Ile Ile Ala Ile Ala Ala Thr
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agccttgaag gcactcattc actcacgcat cgggggctag tacaggctgt gacagaggcc   180

tgagctggaa ctgttgacca ggacacacac atggccatgt ggcctctggg cttcctcaca   240

gcatggtgtc tggattccag gagttggcat cctgagaaac aaccatgcag aagcagccct   300

rtggatcctg gcctggcctt ggagtcaggc agtgtcactc ctgtgccttc taacctgggc   360

ccccgggccc aaggggagga aatggagacc ccacctccca gtggagggaa ggcaaggtcc   420

cactgtgggg gtagcacatg ggatacaccc atgtggctgc cgctggagac gttagtttgc   480

cacacccgtt tcttctacgt gaacatttgc ctgcatctca ccttctaact cctgggtgct   540

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c   601

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<213> Artificial

<220>
<223> amplicon 30-15

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<400> 47

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cagggcccac caggggctca caggaaaggt cgtggaaaat tacaagaaat cttccctctg   180

gcactagcgg gtgaggggaa tggaagccac cgccagacag caccatctcc tcaccctcct   240

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tgggtgtgaa accaagaaaa gacacaaagc caaggaaaag ccattgagaa aacacctggc   600

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